BOSE® 1401™ Series II
Direct/Reflecting® Car Stereo Speaker System

SPECIFICATIONS

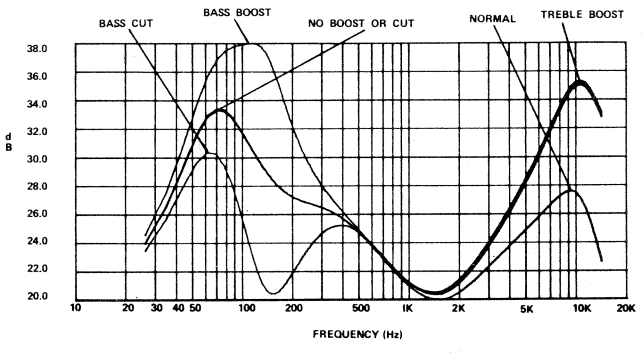
Amplifier/Equalizer

Power Output:	100 Watts continuous power, all four amplifiers, into 0.45 ohm resistive loads.
Individual amplifiers:	25 watts continuous power per amplifier channel into 0.45 ohm resistive load operating from 40Hz to 17kHz with less than .09% THD with 14.4 volts D.C.
Input Inpeadance:	Low Level: 61K ohm. High Level: 20 ohms.
IM Distortion:	.04% at 20 watts output.
Frequency Response:	± 1dB from nominal equalization curve 40Hz to 16kHz with bass control centered and Spatial Control electrically centered.
Separation:	Not Less than 40db above 500Hz, Spatial Slide Control centered.
Signal To Noise Ratio:	Greater than 70dB at full-rated output, "A" Weighted.
Sensitivity:	Low Level Input: .25V RMS for 25 watts output at 1kHz. High Level Input: 2.75V RMS for 25 watts output at 1kHz.
Functional Indicatior:	Green LED.
Low frequency control:	Slider, ± 8dB relative to nominal position in two octave band, centered at approximately 170Hz. (See graph).
Spatial Control™:	Slider, providing front to back speaker balance adjustment above 200Hz. (4 Speaker Configuration).
Rear Panel Treble Sw:	Two Position Switch provides 6dB/octave relative attenuation on rear channels, beginning at 5KHz.
Equalization:	See Graph.
Power Supply Tolerance:	Booster/Equalizer will operate without noticeable performance defects between 10.5V D.C. to 16.5V D.C.
Temperature Tolerance:	-25° C (-13° F) To +60° C (+140° F)
Dimensions:	10" wide x 2 1/2" high x 5" deep. (25.4 x 6.4 x 12.7 cm)
Weight:	2.4 Lbs. 5.28 Kg

Speakers

Speakers:	2 or 4 full range drivers
Size:	4 1/2" in diameter
Magnet:	10 Oz
Voice Coil:	Aluminum Helical winding
Impedance:	0.45 Ohm
Mounting Dimensions:	4 1/2" diameter x 1 1/2" deep (11.4 x 3.8 cm)
Minimum Power:	0.25 watts (-6dBW)
Maximum Power:	25 watts (14dBW)
Weight:	1.5 Lbs per speaker 3.3 Kg

RESPONSE CURVE OF 1401 SERIES II



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$8.00

Service Manual

TECHNICAL DESCRIPTION

The BOSE® 1401 Series II Amplifier/Equalizer incorporates unique circuitry that is different from other auto amplifier designs. We ask that you to take time to read this technical description before attempting to service the Model 1401 Series II, as it will aid you in it's repair.

The Amplifier/Equalizer contains a preamplifier, equalizer, short circuit protection circuitry, remote turn on/off circuitry, Spatial Control™, and four power amplifiers, each delivering 25 watts of power into 0.45 ohms.

The Bose 1401-II is compatible with all front end radio/tape or tape player auto units having their own amplifier, or preamplifer outputs. Low level inputs connect to the output of a front end unit having preamplifer outputs. The 1401-II will produce full output with .25 volts applied to the low level input connections. If the front end has only speaker outputs, the high level inputs are utilized. The input signal is reduced by the 100K resistors R-52,53,72, 73, and then fed to the same differential amplifier as the low level input signal. The high level inputs produce full output with a 2.75 volt input signal.

A differential amplifier (U51) is used at the input to minimize sensitivity to alternator whine and other electrical noise.

The differential amp feeds the equalizer. The equalization curve of the 1401-II has been designed specifically for the Model 1401 drivers mounted inside a vehicle.

The first section of the equalizer adjusts the mid frequencies. The signals are then fed to the network driven by U53 (Pins 10 & 5) which provides both high frequency equalization and the bass slide control. This control provides boost or cut by approximately 8dB centered at 170Hz.

The signal then takes two paths. One is the low frequency path. The signals from both the left and right channels are summed and fed through a lowpass filter. This signal is fed to U53 (Pin 12), the bass equalizaton circuitry. The output of the U53 (Pin 14), becomes a common bass buss, which feeds the low frequency information to all four power amplifiers.

The second signal path is for the mid and high frequencies, which pass thru the Spatial Control™. The slider is a front to back balance control for the mid and high frequencies. This is not a fader control. The slider maintains constant total acoustic power delivered to the listener for any Spatial setting. The Spatial Control allows you to shift the mid and high frequency sound image between the front and rear speakers, with the sum of the power delivered to the front and back speakers remaining the same. This allows great flexibility in compensating for the acoustic properties of various autos, vans, and trucks in which the system may be used.

Also a switchable lowpass filter, S-1 is in the second path. (The switch is located on the rear panel of the 1401.) This control only affects the signal going to the rear speakers of the Model 1401 system. In position I, the high frequencies at the rear speakers are cut 6dB/octave, starting at 5KHz. In position II, the filter is disconnected. This control compensates for different speaker placements.

In most cases, the front speakers are located low in the front door panels, and the rear speakers are placed on the rear deck, using the Direct/Reflecting speaker grilles. In this arrangement, the rear speakers are located at ear level, and can deliver more high frequency energy to the listener than the speakers mounted low in the door panels. The rear speakers might then sound too bright relative to the front speakers, thus the lowpass filter attenuating the high frequency energy to the rear channels. If the front and rear speakers are mounted close to the same height, or the rear speakers are mounted below the rear deck, (GM 4" X 10", for example) then attenuation of the rear speakers may no longer be appropriate.

UNLESS OTHERWISE SPECIFIED, ALL TESTING WILL BE DONE IN POSITION II.

The 1401-II has 4 seperate power amplifers. Each power amplifier receives a

summed signal from the common bass buss, and the mid and high frequency information from the Spatial Control™ slider. Using all 4 speakers to reproduce the bass frequencies provides full rich bass responce while directing the other frequencies to the appropiate left/right/front/back speakers, to maintain proper spatial charastics.

Each power amplifier uses a high slew rate operational amplifier (I.C. U11 Left Front, U21 Left Rear, U31 Right Front, U41 Right Rear). These I.C.'s are the low level stage for each of the power amplifiers. Pins 4 & 7 of the I.C.'s provide out-of-phase signals to the driver transistors. The voltage across the 47 ohm resistor attached to Pin 6 of each I.C. is proportional to the current flowing into the driver transistors.

The bias current of the driver transistors is device dependent. The emitter resistor voltage (R11,12,21,22,31,32,41,42), divided by .47 ohms will give you the bias current of that transistor. The bias current should typically be 20-60 mA, with a maximum of 140mA.

The output transistors are unbiased. Therefore, the output waveform will show crossover distortion. "Glitches" will be visible at higher frequencies when driving a load. The distortion from these "glitches" is well above the range of human hearing.

Power is supplied to the 1401 from the vehicle's fuse block. This is fed directly to the output transistors. A network comprised of R111 and C91 filters the 14.4 V D.C. for all of the I.C.'s in the unit. An 18V zener diode (D55) provides over voltage switching transient and load dump protection. U53, C92, R112, and R113 create a stable voltage that is 1/2 Vcc which is used as a "0" V reference for the audio signal.

NOTE THAT FOR THE 1401 THE "0" VOLT AUDIO SIGNAL MUST BE REFERED TO 1/2 Vcc, NOT GROUND.

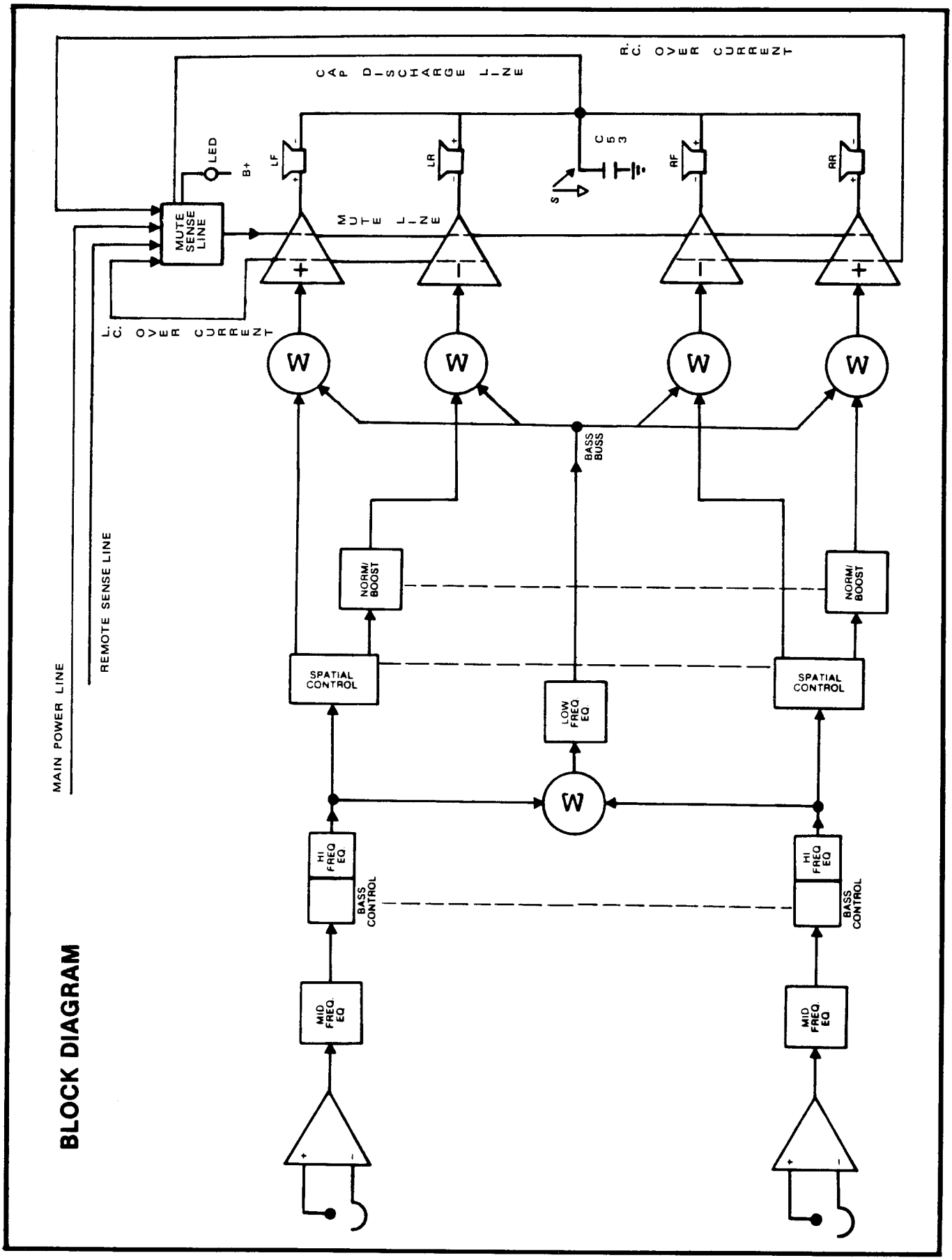
The Turn On/Off Transient Eliminator circuit works in conjunction with the remote turn on and over-current protection circuit. When power is applied to the 1401, the output of U-52 goes high, which turns on Q63. This turns on Q15, Q16 in the left front amplifer, Q25, Q26 on the left rear amplifer, etc, which prevents the driver and power transistors of each amplifer from turning on. This eliminates a turn on "thump" as the amplifers stabilize during power up. U52's output will go low after approximately 3 seconds, turning off Q63, which turns off Q15, Q16 (Left front amplifer) etc, which, in turn enables the driver and output transistors in the circuit to operate.

The turn off detector is Q51 and Q52. When the 1401 is turned off, Q51 turns off, turning on Q52. This makes the gate of SCR Q62 go high, turning on the SCR. This pulls the voltage of pin 6 of U52 low, causing U52 to go high, turning on the transistors Q15, Q16 (left front, etc.) which shuts off the driver and output transistors, eliminating any transients. In addition, when Q52 goes high, it turns on Q61 and Q80 which discharges C-53 (4700uf), the Signal Return capacitor thru R142.

The remote turn on detector is Q53. When voltage is applied to the remote sense line, Q53 shuts off. This makes the gate of SCR Q62 go low, turning off the SCR. This allows C52 to charge, which brings the voltage of pin 6 of U52 up, causing U52 to go low, turning on the driver and output transistors. Also, when Q53 shuts off, Q61 and Q80 shut off, allowing C53 to charge.

The Over-Current protection network is Q54 and Q55. If the unit draws substantial current across either or both R137 or R139 the voltage approaches .6 volts, and the respective transistor will turn on which causes the gate of SCR Q62 to go high, creating the same chain of events as previously mentioned in the turn off section. The over-current protection circuit will attempt to recycle a turn on approximately every three seconds. If the over-current conditions are still present, the unit will not turn on.

The Model 1401-II drivers are designed with an impedance of 0.45 ohms and are capable of withstanding the wide temperature and humidity conditions found in a vehicle. These drivers are not compatible with drivers of similar size. If a driver is to be replaced, it must be replaced with a 1401-II driver.


BLOCK DIAGRAM
MAIN POWER LINE
REMOTE SENSE LINE
MUTE SENSE LINE
LED
B+
CAP DISCHARGE LINE
R.C. OVER CURRENT
L.C. OVER CURRENT
MUTE LINE
LF
LR
RF
RR
C53
S
W
BASS BUSS
NORM/ BOOST
SPATIAL CONTROL
LOW FREQ EQ
HI FREQ EQ
BASS CONTROL
MID FREQ. EQ

DISASSEMBLY PROCEDURES

CAUTION: All disassembly must be accomplished with the D.C. power supply turned off.

Tools Required:

1. #15 Torx Head
2. #9 Torx Head

Bottom Cover

Note: Printed Circuit Board is mounted "upside down" within the 1401-II.

1. Position both slider controls to center.
2. Using #15 Torx head, remove 4 screws (2 on each side of heat sink).
3. Gently lift and rotate bottom cover towards the front of unit and set aside. (The slider knobs will stay with bottom cover.)

Top Cover

1. Using #15 Torx bit, remove the 2 screws holding cover to heat sinks.
2. Turn unit over so that the printed circuit board's components are visible.
3. Using a #9 Torx bit, remove the screw holding the harness clamp. Note the size of the screw.
4. Remove the #9 Torx screw and insulator from the center of the PCB.
5. Remove the #9 Torx screw at the front of unit, near Logo.
6. Lift unit out of the cover.

CAUTION: DO NOT put any excess pressure on the heat sinks. Pressure can cause internal damage to output transistors.

REASSEMBLY PROCEDURES

Top Cover

1. Align PCB with top cover.
2. Replace all 3 #9 Torx screws and insulators. (Note: shortest screw is for the center PCB Mount.)
3. Replace the 2 #15 Torx screws to the top cover.

Bottom Cover

1. Place unit with components facing up.
2. Position slider controls to center.
3. Place bottom cover over PCB and align knobs.
4. Make sure cover is properly seated and replace the 4 #15 Torx screws.

CAUTION: Do Not overtighten the 4 Torx screws.

TEST PROCEDURES

CAUTION: Due to the complexity of this Amplifier/Equalizer, do not attempt to test this unit without following the test procedure outlined below.

Test Equipment Required:

1. Dual-trace oscilloscope
2. Digital multi-meter
3. Audio signal generator
4. Distortion analyzer
5. D.C. power supply with current and voltage meters - 15V 25A minimum
6. Four (4) 100 ohm load resistors
7. Four (4) .45 ohm load resistors (see diagram on page 8.)

PROCEDURE TESTS THESE CIRCUITS:

1. High and low level inputs
2. Output balance:
   (Left/Right, and Front/Back)
3. Delay Turn On/Off
4. Frequency response
5. Low frequency control
6. Spatial Control™
7. Treble level control
8. Power output
9. Distortion
10. Short Circuit Protection

Initial Test Procedure:

1. Disconnect the 1401-II from power supply and loads.
2. Set ohmmeter to R X 1 scale.
3. With Positive lead of meter to the Red power wire of 1401, measure the resistance of the 1401 Series II power leads.

A. Meter should read "infinity".

4. With leads reversed:

A. Meter should read about 6 ohms.
B. If readings are correct, proceed with testing.

CAUTION: If you get an incorrect reading, DO NOT apply power to the unit. Check for shorted driver or power transistors.

Connections For Electrical Test

CAUTION: All connections must be accomplished with D.C. power supply OFF.

Amplifier/Equalizer

1. Back panel settings:

A. Treble Level switch: Position II

2. Front panel settings:

A. Spatial Control™ : centered
B. Low frequency control: centered

NOTE: The Model 1401-II has 4 separate amplifiers, 2 of which are 180° out-of-phase with the remaining two amplifiers. Also, the outputs are returned through the Model 1401-II's SPEAKER REFERENCE. It is IMPORTANT to connect the unit as directed to prevent activation of the Current protection circuits. DO NOT connect speaker returns to ground!!

3. Audio Output Connections:

A. Connect output connections to 100 ohm load resistors as shown on Page 8.
B. If output cables have been cut, follow color code below:

Left Front:

Output: Yellow Return: White

Right Front:

Output: Green Return: Orange

Left Rear:

Output: Blue Return: Yellow

Right Rear:

Output: Orange Return: Gray

4. Power Connections:

A. Red: +14.4 V.D.C. (Power Lead)
B. Violet: +14.4 V.D.C. (Control Lead)
C. Black: Ground (Chassis Ground)
D. Brown: Ground (Audio Ground)

Test Equipment Connections:

Audio Signal Generator:

1. Connect audio signal generator to Low Level inputs (RCA Jacks), no signal applied.
2. Add jumper wire from generator's signal return lead to BROWN wire of 1401 power lead.

Dual Trace Oscilloscope:

1. Channel 1: Left front output (Yellow)
2. Channel 2: Right Front output (Green)

Distortion Analyzer:

1. Same as oscilloscope

ELECTRICAL TEST PROCEDURE
100 OHM RESISTIVE LOADS

1. Apply 14.4 V.D.C. to the 1401-II.

A. Green Functional indicator lights.
B. Amplifier/Equalizer draws 250mV Max.

If unit does not turn on or if it attempts to turn on every 3 seconds but shuts down, check for shorted output/driver transistors.

2. Signal generator to: 125mV, at 1kHZ.
A. Electronically center Spatial Control slider so that both outputs are identical on oscilloscope.

3. Observing polarity, check each output of 1401-II at 100 ohm loads.

A. Approximately 1.45V on all outputs ± 1dB.

4. Remove power from the Red lead of the 1401-II.

A. Signal will immediately disappear.

5. Reapply power to the Red lead of the 1401-II.

A. Signal will reappear after approximately 3 seconds.

6. Remove power from the Violet lead of the 1401-II.

A. Signal will immediately disappear.

7. Reapply power to the Violet lead of the 1401-II.

A. Signal will reappear after approximately 3 seconds.

8. Signal generator to: 35mV, 100HZ.

A. Check each output of 1401-II at 100 ohm loads. Reading should be approximately 1.45V on all outputs ± 1dB.
B. All outputs will be ± 1dB of original settings.

9. Slide Low Frequency control to maximum cut.

A. All channels: -6.5dB ± 1 dB.

10. Slide Low Frequency control to maximum boost.

A. All channels: +6.5dB boost ± 1dB.

11. Return Low Frequency control to center position.

12. Signal generator to: 35mV, 15kHZ.

A. Check each output of 1401-II at 100 ohm loads. Reading should be approximately 1.45V on all outputs ± 1dB.
B. All outputs will be ± 1dB of original settings.

13. Spatial Control™ slider to maximum right (front speakers).

A. Front outputs: +1dB boost ± 1dB.
B. Rear outputs: greater than -30dB cut.

14. Spatial Control slider to maximum left (rear speakers).

A. Front outputs: greater than -30dB cut.
B. Rear outputs: +1dB boost ± 1dB.

15. Electronically center Spatial slider.

16. Connect oscilloscope to left and right rear channels.

17. Set Treble level switch to position L.

A. Rear channels will drop 10.5dB ± 1dB.
B. Return Treble level switch to position II.

18. Perform steps 2 thru 15 for rear channel amplifers.

19. Shut power supply OFF.

POWER, DISTORTION, SHORT CIRCUIT PROTECTION, AND HIGH LEVEL INPUT TEST 0.45 OHM RESISTIVE TESTS:

Connection Procedures:

1. Connect outputs to .45 ohm load resistors as shown on Page 8.

A. If cable has been cut, follow color code as indicated in step 3 of CONNECTIONS FOR ELECTRICAL TEST.
B. All other connections remain the same.

2. Reapply power.

3. Signal generator to: 1kHZ, and increase signal until 1401 just begins to clip.

A. Minimum output, all channels: 3.36V.

4. Signal generator to: 1kHZ and decrease until 1401's output signal is 3.2V.

A. Distortion measurements, all channels: .09%.

Note: The length and size of the output wiring and the connection to the load is very important. Make sure connections are as tight as possible to achieve correct distortion readings.

5. Reduce output of signal generator until output of 1401 is 1.5V.

6. Take any channel output and short to ground.

A. Unit will immeadiately shut down.
B. Unit will try to turn on approximately every 3 seconds.

7. Remove short circuit condition.

A. Unit will turn on in approximately 3 seconds.

8. Connect signal generator to High Level inputs.

A. Left Positive Input:

B. Left Negative Input:

C. Right Positive Input:

D. Right Negative Input:

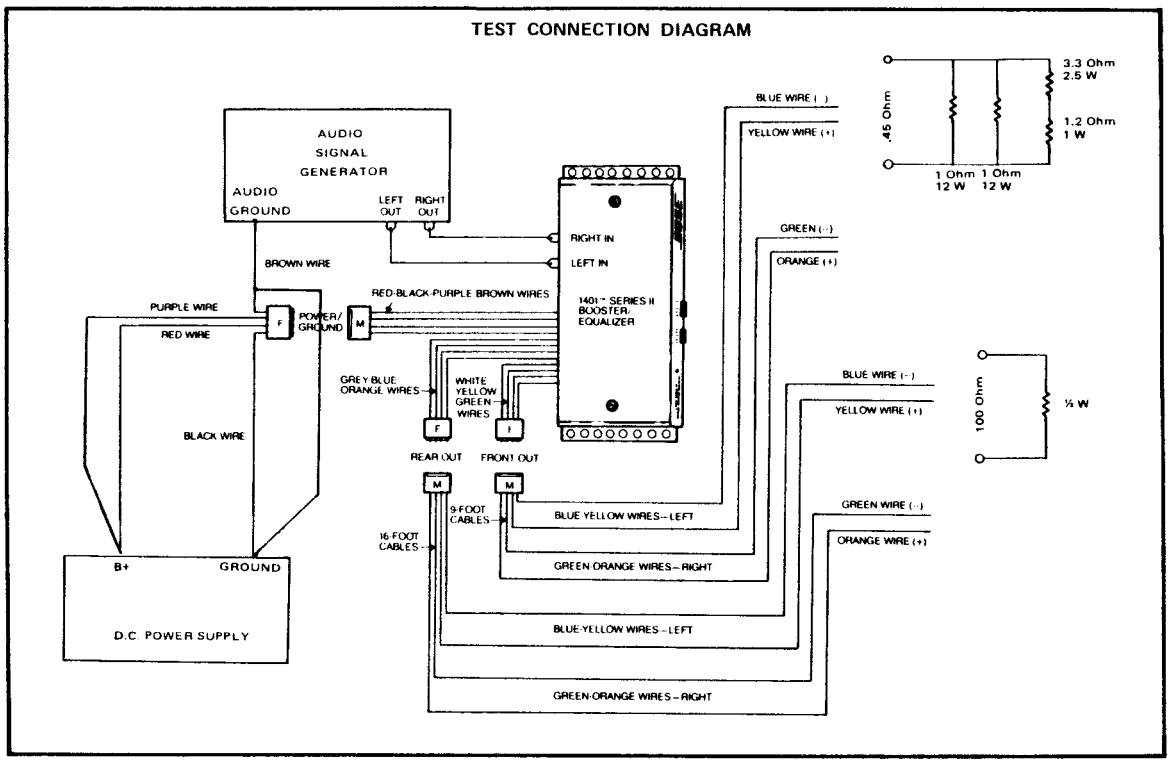
9. Adjust signal generator to 1kHz.

10. Re-apply power to 1401-II.

11. Increase output of signal generator until 1401 starts to clip. Signal to input of 1401-II should be 2.75V at 1kHz.

A. If one or both channels are not functioning for this test and previous tests are fine, check high level input capacitors or R52,53 (Left) R72,73 (Right).

12. Remove Power from 1401-II.



SERVICE NOTE

In early production units, it was found that if the 1401-II grounds are not properly connected during installation, R-142 could fail. We have since modified the 1401-II to correct this potential problem. All units manufactured below date code 64983 (Date Code located at the center of the bottom label) should be modified to prevent this potential failure. See BOSE Service Bulletin 1401-II-02 for further information.

MODIFICATION PROCEDURES

NOTE: For further information consult BOSE Service Bulletin 1401-II-02.

1. Disassemble top and bottom covers.
2. Locate and remove C-53 (4700 uF Electrolytic).
3. On the component side of the PCB, cut etch on the NEGATIVE leg of C-53 going to the emitter of Q-80.
4. On the underside of the PCB, add an insulated jumper from the emitter of Q-80 to the Cathode of SCR (Q-62).

NOTE: The Cathode of SCR (Q-62) is also tied to Pin 1 of IC-U52.

5. Re-install C-53.
6. Check R-142 (2.2 Ohm, .5 watt) and replace if necessary.
7. Perform functional test
8. Reassemble top and bottom covers.

SERVICE NOTES

1. The operating range of the 1401 is from 10.5 to 16.5 volts D.C. When the power supply falls below 10.5 volts, the turn on/off circuitry will not function, and the unit will not turn on. To insure proper operation, the power supply must be above 10.5 volts.

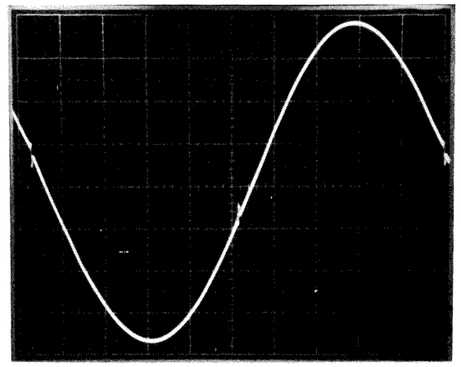
2. The 1401 is driven to full output power by low level audio signals of .25 volts at 1KHz (250 Millivolts) and high level audio signals of 2.75 volts at 1KHz. Audio signals below these levels will not produce full power output and units with audio signals substantially above these levels will cause the unit to be overdriven.

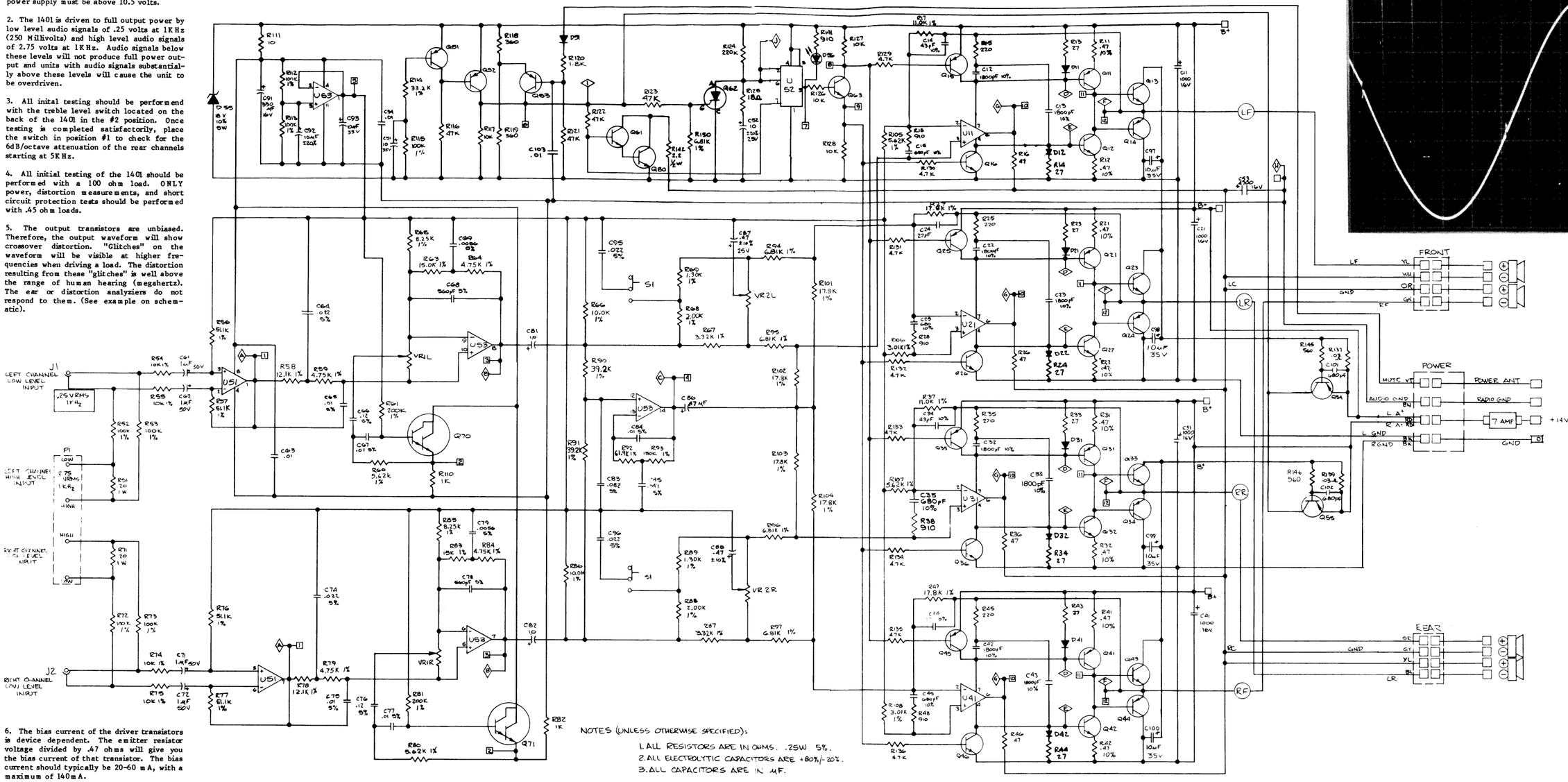
3. All inital testing should be performend with the treble level switch located on the back of the 1401 in the #2 position. Once testing is completed satisfactorily, place the switch in position #1 to check for the 6dB/octave attenuation of the rear channels starting at 5KHz.

4. All initial testing of the 1401 should be performed with a 100 ohm load. ONLY power, distortion measurements, and short circuit protection tests should be performed with .45 ohm loads.

5. The output transistors are unbiased. Therefore, the output waveform will show crossover distortion. "Glitches" on the waveform will be visible at higher frequencies when driving a load. The distortion resulting from these "glitches" is well above the range of human hearing (megahertz). The ear or distortion analyziers do not respond to them. (See example on schematic).

EXAMPLE No. 1 High Frequency "Glitch"





NOTES (UNLESS OTHERWISE SPECIFIED):

1. ALL RESISTORS ARE IN OHMS. .25W 5%.
2. ALL ELECTROLYTIC CAPACITORS ARE +80%/-20%.
3. ALL CAPACITORS ARE IN μF.

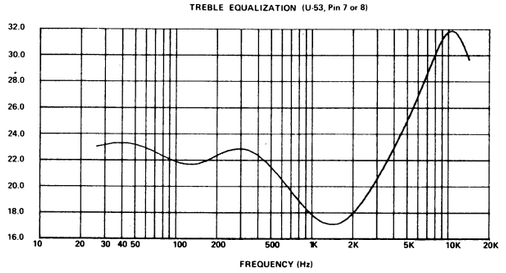
6. The bias current of the driver transistors is device dependent. The emitter resistor voltage divided by .47 ohms will give you the bias current of that transistor. The bias current should typically be 20-60 mA, with a maximum of 140mA.

7. The signal from left rear and right rear channels are 180° out-of-phase with the front channels. This is corrected by speaker connections.

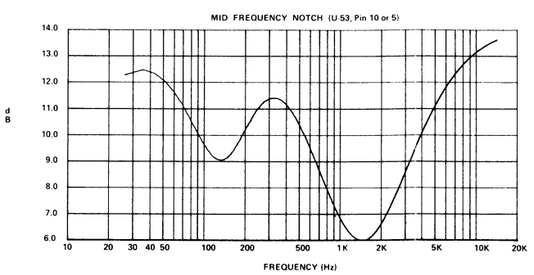
8. Connections for testing should be as shown in Test Connection Diagram. Note that signal ground is connected to the D.C. power supply and the signal generator.

9. In early production units, it was found that if the 1401-II grounds are not properly connected during installation, R-142 could fail. We have since modified the 1401-II to correct this potential problem. All units manufactured below date code 64983 (Date Code located at the center of the bottom label) should be modified to prevent this potential failure. See note on page 8 or BOSE Service Bulletin 1401-II-02 for further information and modification instructions.

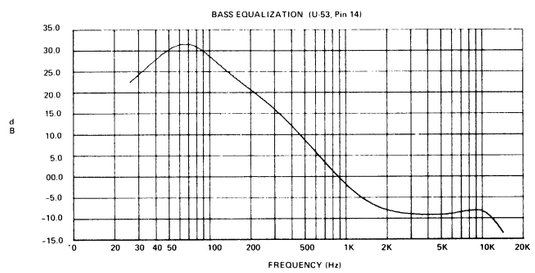
TREBLE EQUALIZATION (U-53, Pin 7 or 8)



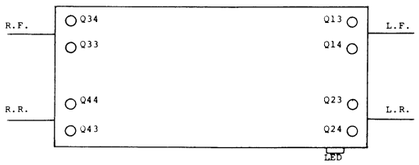
MID FREQUENCY NOTCH (U-53, Pin 10 or 5)



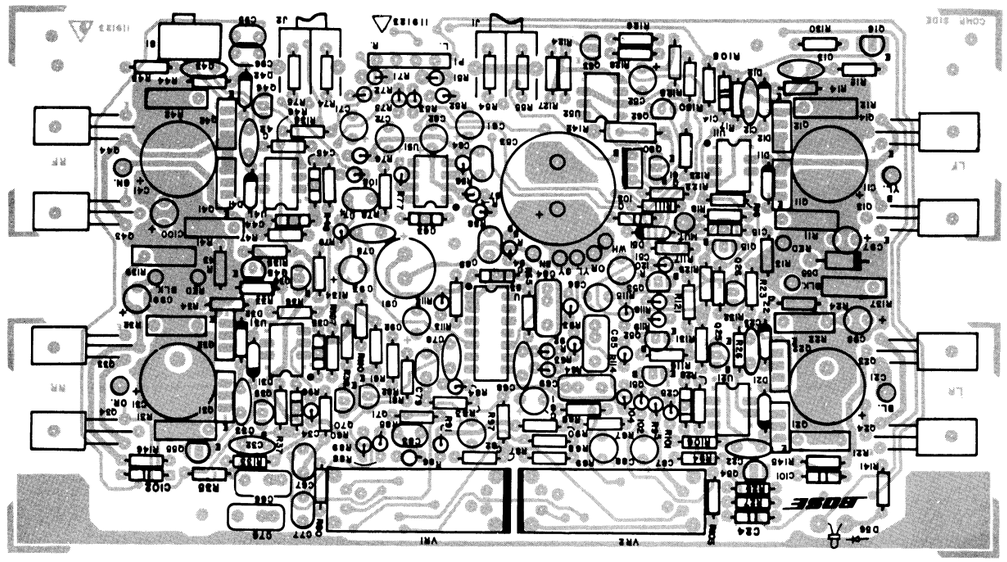
BASS EQUALIZATION (U-53, Pin 14)



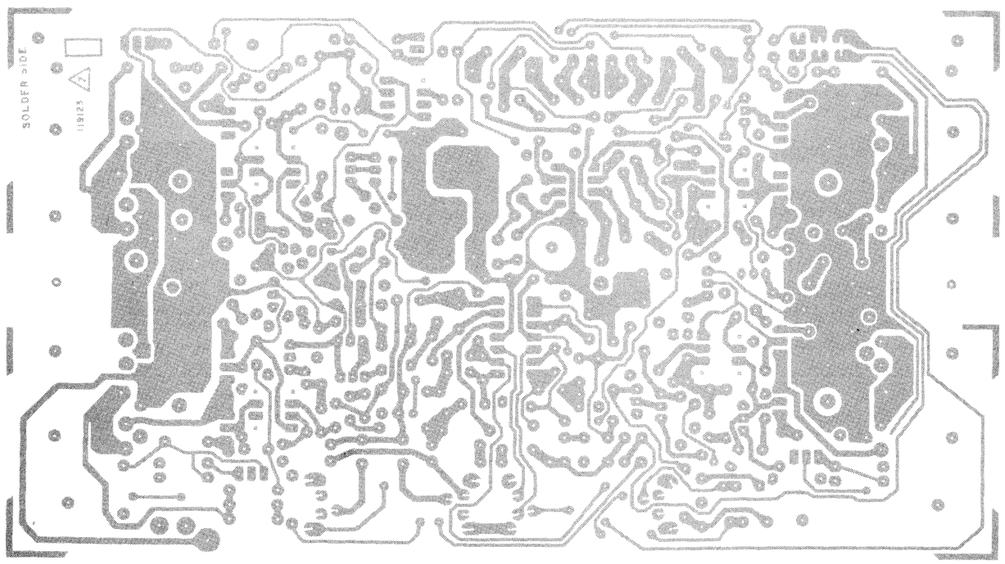
OUTPUT TRANSISTOR LOCATION DIAGRAM



TOP ETCH AND COMPONENT VIEW



BOTTOM ETCH VIEW



Amplifier/Equalizer Parts List

Symbol	Description	Part Number
	I.C.'s	
U11,21,31,41	IC Amp NE-538N	112559
U51	IC Dual Op Amp 4559	108576
U52	IC 555	114012
U53	IC Quad Op Amp TL074	120535
	Transistors	
Q11,21,31,41	National NSDU51, PNP	112998
Q12,22,32,42	National NSDU01, NPN	112999
Q13,23,33,43	National D44H8 NPN	121410-02
Q14,24,34,44	National D45H8 PNP	121410-01
Q15,25,35,45,51,52,53,54,55	PNP Transistor	119168
Q16,26,36,46,61,63	NPN Transistor	117921
Q62	Silicon Controlled Rectifier	120683
Q70,71	NPN Darlington	119204
Q80	NPN 2SD-826	119203
	Diodes	
*This diode is selected and must be ordered from factory.		
D11-12,21-22,31-32,42,51	1N4150	121542*
D55	1N5355B (Zener 18V/5W)	112551
D56	Led, Green	119880
	Capacitors	
C11,21,31,41	1000 uF 16V Elec	120764
C12,13,22,23,32,33,42,43	1800 pF 50V 10% Disc	119017-182
C14,34	43 pF 50V 10% Tubular NPO	117245-430107
C15,25,35,45,101,102	680 pF 50V 16% Tubular Y5P	119274-681102
C24,44	27 pF 10% 50V Tubular NPO	117245-270107
C51,93,97-100	10 uF 35V Elec	120763-100
C52,92	10 uF 25V 20% Elec, Low Leak	119202
C52,92	10 uF 25V 20% Low Leak (Alt)	114035
C53	4700 uF 16V Elec	119198
C61,62,71,72,81,82	1 uF 50V Elec Low Leak	119942-1R0
C63,94,103	.01 uF 20% 25V Tubular Y5R	119273-103201
C64,74,95,96	.022 uF 100V 5% Film	118091-223
C65,67,75,77,84	.01 uF 100V 5% Film	118091-103
C66,76	0.12uF 100V 5% Film	120388-124
C68,78	560 pF 50V 5% Disc	119272-561
C69,79	.0056 uF 100V 5% Film	118091-562
C83	.082 uF 100V 5%, Film	118091-823
C85	.047 uF 100V 5% Film	118091-473
C86	.47 uF 50V Elec	119943-R47
C87,88	.47 uF 25V 10% Low Leak	119315
C91	330 uF 16V Elec	113173
	Resistors	
Unless otherwise stated, all resistors are 1/4 watt		
R11,12,21,22,31,32,41,42	.47 Ohm 2W 10%	108904
R13,14,23,24,33,34,43,44	27 Ohm 5% CF	117704-1212705
R15,25,35,45	220 Ohm 5% CF	117704-1212215
R16,26,36,46	47 Ohm 5% CF	117704-1214705
R17,37	11K Ohm 1% MF	119976-2211102
R18,28,38,48,141	910 Ohm 5% CF	117704-1219115
R27,47,103	17.8K Ohm 1% MF	119976-2211782
R51,71	20 Ohm 1W 5%	104064-200
R52,53,72,73,112,115	100K Ohm 1% MF	119976-2221003
R54,55,66,74,75	10K Ohm 1% MF	119976-2211002
R56,57,76,77	51.1K Ohm 1% MF	119976-2225112
R58	12.1K Ohm 1% MF	119976-2221212
R59,64,79,84	4.75 Ohm 1% MF	119976-2224751
R60,80,105,107	5.62K Ohm 1% MF	119976-2215621
R61,81	200K Ohm 1% MF	119976-2212003
R63	15K Ohm 1% MF	119976-2215002
R65,85	8.25K Ohm 1% MF	119976-2218251
R67,87	3.32K Ohm 1% MF	119976-2213321
R68	2K Ohm 1% MF	119976-2212001
R69	1.30K Ohm 1% MF	119976-2211301
R78	12.1K Ohm 1% MF	119976-2211212
R82,110	1K Ohm 5% CF	117704-1211025
R83	15K Ohm 1% MF	119976-2211502
R86	10K Ohm 1% MF	119976-2221002
R88	2K Ohm 1% MF	119976-2222001
R89	1.3K Ohm 1% MF	119976-2221301
R90	39.2K Ohm 1% MF	119976-2213922
R91	39.2K Ohm 1% MF	119976-2223922
R92	61.9K Ohm 1% MF	119976-2226192
R93	150K Ohm 1% MF	119976-2221503
R94,97,150	6.81K Ohm 1% MF	119976-2216811
R95,96	6.81 Ohm 1% MF	119976-2226811
R101,102,104	17.8K Ohm 1% MF	119976-2221782
R106	3.01K Ohm 1% MF	119976-2213011
R108	3.01K Ohm 1% MF	119976-2223011
R111	10 Ohm 5% CF	117704-1211005
R113	100K Ohm 1% MF	119976-2211003
R114	33.2K Ohm 1% MF	119976-2223322
R116,121-123	47K Ohm 5% CF	117704-1214735
R117,126-128	10K Ohm 5% CF	117704-1211035
R118	360 Ohm 5% CF	117704-1223615
R119	560 Ohm 5% CF	117704-1225615
R120	1.8K Ohm 5% CF	117704-1221825
R124	220K Ohm 5% CF	117704-1212245
R125	18 Ohm 5% CF	117704-1211805
R129-136	4.7K Ohm 5% CF	117704-1214725
R137,139	.03 Ohm 2W 10%	119748
R142	2.2 Ohm .5W 1% MF	113777-2R2
R145,146	560 Ohm 5% CF	117704-1215615
S2	Slide Switch	112553
VR1,2	Slide Pot, 20K	112546
	Cosmetic	
Zinc Cover		114586
Case		114521
Knob		111994
Front Panel		118975
	Miscellaneous	
Amplifier Carton		119314
Amplifier/Speaker Carton		119212
Single System Carton		119777
Literature Kit		119771
Owner's Manual		119287
	Hardware	
P1	Connector 4 Pos	112738-04
J1,2	Jack PC Mount	110386
PCB Insulator		121431
Insulator TO-220	Q13,23,33,43	112564
Heat Sink, Transistor	Q11,12,21,22,31,32,41,42	112733
Tie Wrap		116937
Washer, Shoulder #4	Q13,23,33,43	113437
Screw, Front Panel	Ext. Tooth #6 Lock Washer	108261-06
Screw	#6-32 x .50 Self Tap TORX	112581-08
Screw	#6-32 x .31L Self Tap TORX	112581-05
Screw	#6-32 x .75 Self Tap TORX	112581-12
Screw	Q13,14,23,24,33, 34,43,44	103140-06
Kep Nut #4-40	Q13,14,23,24,33,34,43,44	100413-5
Kep Nut	D56, #6-32	100413-1
Bracket	D56	119364
Sleeving	D56	107679-20
Spacer, LED	D56	113523
Washer, Flat	#4 Nylon	108259-04
Screw	#4 THD Forming .25L	112650-04
Screw	#4 THD Forming .37L	112650-06
Screw	#4 THD Forming .50L	112650-08
	Assemblies	
Input Wire Assy		112748
Connector	4 Pin	112739-04
Front Speaker Output Assy		121795
Rear Speaker Output Assy		121796
Connector, 4-Terminal	Male	119309-1
Faston	Uninsul Receptable .250	119310-1
Front Speaker Cable Assy		121794
Rear Speaker Cable Assy		119220
Amplifier Power Cable Assy		119218
Faston	Male Tab	119311
Faston	Insul Socket	120376
Faston	Female	121530
Connector	Female	119308-1
Auto Power Cable Assy		119215
Ring Terminal		112747
Faston	Female	103035
Faston	Male	114278
Fuse Holder		112728
Fuse	7-Amp	113587-070
Connector	4-Term, Male	119309-1
Faston	Noninsul, Female	119310
Faston	Female Terminal	119816
Accessory Kit		119303
Support Bracket		112501
Spacer Kit		119093
	Speaker Parts List	
1401 Series II Speaker		119179
Plain Grille Assy		119548
Escutcheon, Plain		119872
Ring Ding		112410
Speaker Mounting Kit		119304
Deluxe Speaker Pair		119210
Instruction Sheet		212412
Frame		111768
Reflector Assy		111785
Escutcheon, Deluxe		119511
Ring Ding		112410
Speaker Mounting Kit		119304
Speaker Mounting Kit		119304
Screw	#8x1 1/4L	112511-20
Tinnerman Clip	#8 1/8 Panel	112512
Tinnerman Clip	#8 1/4 Panel	118518
Fiber Washer	#8x3/8	112519
Grommet		119917
Instruction Sheet		119546
Instruction Card		120814
Tinsel Guard		121528

TROUBLE-SHOOTING GUIDE

1. No power, no sound (LED not illuminated):

   A. Improper power and/or ground connection
   B. Fuse in power line blown or missing.
   C. Purple control lead improperly conected.

2. Power Indicator on Amplifier illuminated, no sound/sound on one channel only:

   A. Poor input connection between car radio/cassette unit and Amplifier.
   B. Poor output connection between Amplifier and speakers.
   C. Radio/Cassette unit off balance or control set incorrectly.
   D. One channel of radio/cassette unit deffective.
   E. Input circuits of Amplifier/Equalizer deffective.

3. No Sound, speakers make short repetitive "clicking" noises:

   A. Protection system is indicating an improper speaker connection.

4. Music plays in short repetitive bursts:

   A. Protection system is indicating an improper speaker connection.

5. "Thin" sound with poor channel seperation:

   A. Speakers wired out of phase (spliced wiring only)
   B. Inputs wired out of phase.
   C. Inadequate speaker baffling.

6. Excessive hissing or muffled sounds:

   A. Dirty or magnetized tape head.
   B. Radio not tuned correctly.
   C. Tone controls on radio set incorrectly.
   D. Spatial slider is set incorrectly (two speaker system only).

7. Music sounds harsh or distorted or sound "breaks up" at high volume:

   A. Front end is distorting, or overdriving Amplifier/Equalizer.
   B. Inadequate power/ground connection (LED may flicker on and off)

8. System turns itself off when vehicle engine is off:

   A. Battery voltage is low.

9. Vehicle lights flicker or dim on high volume passages:

   A. Weak battery, defective vehicle electrical system.

10. Noise when air conditioner or other accessories are turned on:

    A. Accessory needs noise suppression.

11. Buzzing or vibration when music is played:

    A. Inadaquate speaker mounting.
    B. Structural resonance inside vehicle.

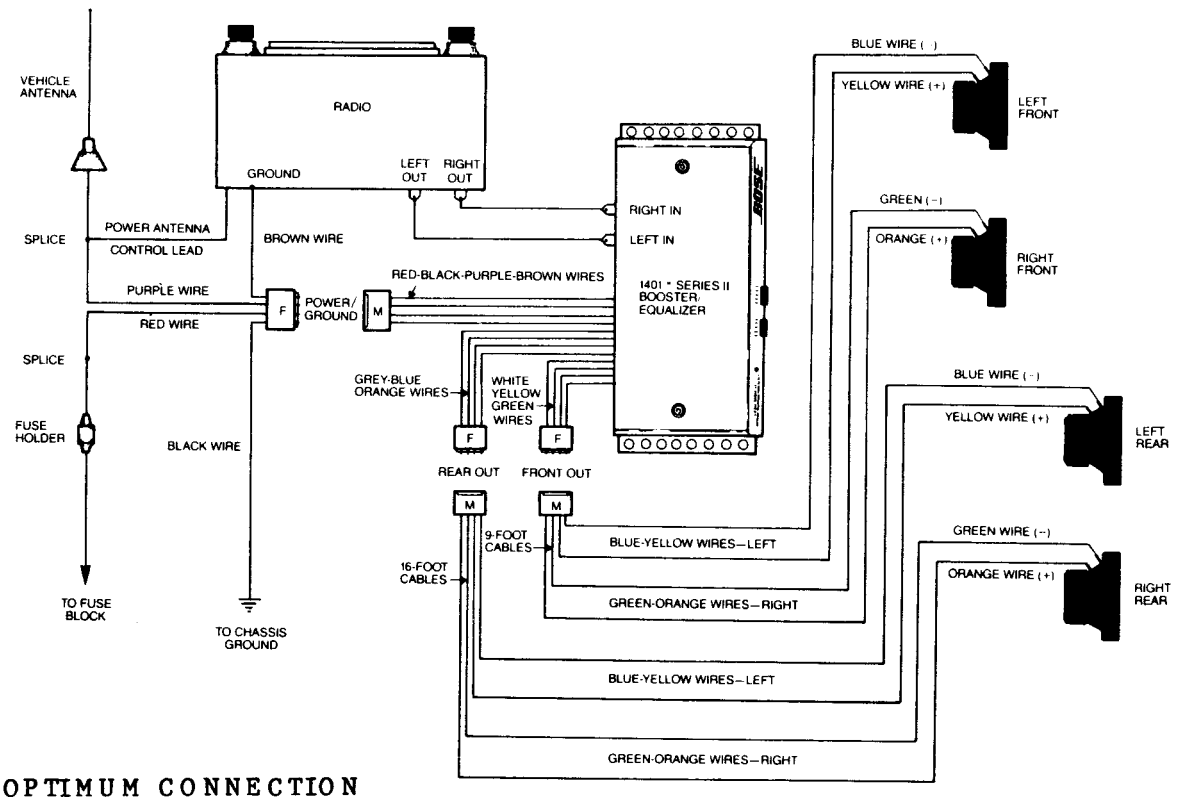
12. Ignition noise:

    A. Noise-carrying wire located near output of radio or input of 1401.
    B. Improper ground connection.

13 Whine, changing with engine speed:*

    A. Improper wiring.**
    B. Poor Antenna connection.
    C. Brown (Audio Ground) wire not connected to radio chassis.
    D. Black (Signal Ground) wire is connected to radio chassis.
    E. Alternator has excessive ripple and noise supression is needed.

CONNECTION DIAGRAM



** OPTIMUM CONNECTION

LOW LEVEL INPUT SENSITIVITY CHANGES

The Bose Model 1401 Series II complies with the E.L.A. interface standard for car stereo products. (Low level input of 250 millivolts produces full output). The 1401-II is easily connected to any radio or tape deck complying with this standard. We have enclosed the following modifications to accommodate front end units that do not yet comply with the E.L.A. standard.

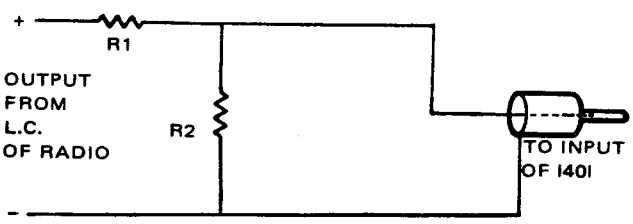
A front end with an output voltage less than 250 millivolts will not drive the Model 1401-II amplifier to full output. It is possible to modify the input differential amplifier to increase the 1401-II's sensitivity.

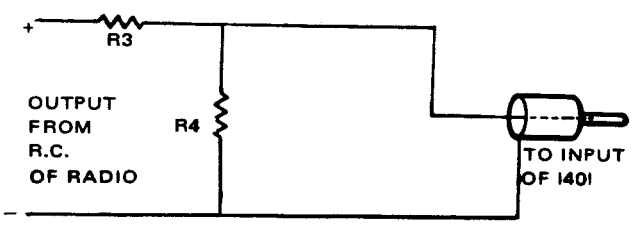
A. For front end units with an output voltage of 100 millivolts, perform the following modification:

Change the values of the following resistors using 1/4 watt, 2%:

Resistors:	From:	To:
56, 57, 76, 77:	51.1K	100K
54, 55, 74, 75:	10K	7.5K

B. A front end unit with an output voltage in EXCESS of 500 millivolts, will drive the 1401-II to full output with very little rotation of the volume control. It is possible to reduce the output level of the front end by placing an attenuator between the output of the front end unit and the 1401's input. See chart for basic attenuation values.





PREAMP OUTPUT	R1, R3	R2, R4
500 mV	1 k Ohm	1 k Ohm
750 mV	1 k Ohm	500 Ohm
1 Volt	1.5 k Ohm	500 Ohm

Specifications and features subject to change without notice.

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Better sound through research.

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